ATOMIC ENERGY Newsletter

THE FIRST AND ONLY A

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Dear Sir:

The possibility of constructing a "package" nuclear power plant for military use is now to be investigated. First steps have been negotiations by the USAEC and requests for bids from firms capable of constructing an experimental version of such a power plant. The successful firm will be given a fixed price contract. The plant considered is based on a preliminary design by Oak Ridge National Laboratory. The nuclear reactor would use enriched uranium fuel and be moderated and cooled by ordinary water under pressure. This reactor is of a type already developed for other applications; hence, it is possible to ask for bids on a fixed price contract basis. Purpose of building this prototype plant (in addition to demonstrating that its design is suitable for the military and to determine operating characteristics) is to provide a training facility for military engineers, operating crews, and maintenance people, of the Corps of Engineers of the U. S. Army.

The detonation of a fusion device (the so-called hydrogen bomb) on March 1st, in the Marshall Islands, as part of the current nuclear experiments underway there, was revealed in Washington last week by Congressional sources. The explosion was greater than had been estimated and pushed a cloud of radioactive particles well beyond the test area. (As a consequence, 23 Japanese fishermen suffered burns and injury from radioactivity.) The explosion was considered by observers capable of destroying an area within a six-mile radius of the detonation point. Following the detonation, a dust cloud approximately 15-miles in height, and 27-miles in diameter, was observed.

Gunnar Gold Mines will be producing uranium on a profitable basis by Sept. 1, 1955, president Gilbert A. LaBine told a recent stockholder's meeting in Toronto. He also explained that the change in name to Gunnar Mines, Ltd., would more accurately reflect the nature of the company's activities. The company's major orebody at Lake Athabaska, Mr. LaBine stated, has ore reserves sufficient for 10 to 12 years of operations. He noted also that a contract has been negotiated between Gunnar and the Government's ore buying organization, Eldorado Mining & Refining, Ltd. (Other RAW MATERIAL news, page 5 this LETTER.)

A third nuclear powered submarine has been included in the U. S. Navy's plans for fiscal 1955, testimony in Washington revealed last week. Outside of provisions made in the Navy's budget for the craft, there were no further details. (The first nuclear powered underseas craft, the Nautilus, was launched in December by the Electric Boat Division of General Dynamics Corp., in Groton, Conn. The nuclear reactor and auxiliary equipment are now being installed. The second, the Sea Wolf, now is under construction at the same yards in Groton.)

An exchange of proposals was completed last week by the United States and the Soviet Union for international handling of atomic energy, when the Soviet Ambassador received from U. S. Secretary of State John Foster Dulles the details of President Eisenhower's plan for the creation of an international pool of atomic materials.

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BUSINESS NEWS... in the nuclear energy field...

INCREASED BUYING BY USAEC EXPECTED:- An increase in the buying of products used by the USAEC in the operation of its plants and facilities will take place in the period ahead, George C. Taylor, of the USAEC's supply division told a meeting of the Atomic Industrial Forum in New York last week. In 1953, he said, dollar volume commitments for materials, supplies, and equipment for the USAEC's plants were between 800 and 900 million dollars. About half of this was for products used in the plants, laboratories, and testing facilities of the USAEC; balance was for construction materials. Construction material purchases will taper off, he said, while product buying will increase.

For suppliers or manufacturers who wonder whether the USAEC is a market for their products, Mr. Taylor cited specific purchases made at various USAEC operations offices. At Grand Junction, Colo., center of ore purchase activity, products bought include soda ash, ore processing equipment and machinery, fuels and lubricants, radiation detection equipment, and automotive equipment. The New York operations office is also concerned with uranium concentrates, he noted, and buys products such as are associated with large chemical and ore processing plants. Items for research and development are also purchased through New York; recent items bought include electrical equipment, refrigeration systems, computing machines, and products typically associated with scientific laboratory work. At Oak Ridge, Paducah, and Portsmouth, where uranium-235 plants are in operation or under construction, and at Hanford (plutonium production) and Savannah River (materials for fusion weapons), purchases include pile grade graphite, organic and inorganic acids such as hexone and nitric acid, pipes and valves, high precision instruments, pressure and temperature monitoring equipment, etc. The Santa Fe operations office, which handles weapons research and development, and weapons production, buys such items as electronic material and equipment, electronic testing devices, metal stocks, and products generally associated with a large laboratory. In addition, nuclear weapon production contractors use substantial quantities of castings, forgings and machined parts, aluminum, brass, copper, steel, and various other metal alloys. Here, high precision is a usual requirement. The other USAEC offices (Chicago, Schenectady, and Idaho Falls) are concerned with nuclear reactors; their purchases (and those of their contractors) include laboratory equipment and supplies, helium, nitrogen, freon and argon gases, remote manipulators, chemicals, etc.

MODIFICATIONS TO CHEMICAL PROCESSING PLANT BEING MADE:- As the first step in modifications to the chemical processing plant at Idaho Falls (national reactor testing station), a contract has been negotiated by the USAEC with Blaw-Knox Co., Pittsburgh, for the engineering and design of these modifications. Blaw-Knox (chemical plants division) has been at work for several months on initial aspects of this work, and now will carry the design work through to completion. Construction, by another contractor (on a cost-plus basis) is scheduled to begin in May, 1954. (The chemical processing plant is used in the reclamation of "unburned" uranium-235 from used reactor fuel elements, of the various nuclear reactors at the station. Operated by Phillips Petroleum, it started processing irradiated fuel elements in January, 1953.)

FIRST NUCLEAR POWERED ELECTRIC UTILITY PLANT TO BE IN PITTSBURGH AREA:- The Duquesne Light Co., one of the nine firms which submitted proposals for building the first full-scale central station nuclear power plant in the United States, is to receive a USAEC contract to build and operate the plant. Total costs of the plant are estimated to be $45 million. Duquesne will assume $5 million of the cost of the nuclear reactor itself, which Westinghouse Electric is to build, and which the latter now has in an advanced design stage. Under this contract Duquesne will erect the plant on land it owns in Pittsburgh, and operate the new electric generating plant, at no cost to the government. It will also operate the reactor part of the plant, and bear the labor costs involved. Duquesne will also pay the USAEC at the rate of 48.3 cents per million BTU's of steam used in the turbines for the first year, with the rate increasing annually until it reaches 60.3 cents in the fifth year. (It is not expected that this plant will produce electric power at costs competitive with power from conventional fuels. The main objective is to gain more design and technological experience than could be obtained from a smaller plant.)

THE NUCLEAR REACTOR PROGRAM OF THE USAEC: Important highlights of speech by Henry D. Smythe, USAEC Commissioner, at American Institute of Chemical Engineers annual meeting, Washington, D.C., March 9th, 1954.

Five major nuclear power reactors will be built in the next five years as part of the USAEC's intensive drive toward economically useable nuclear reactor generated power.

The pressurized water reactor, which has been announced previously, is the first to get underway. To produce 60,000-kilowatts of power, this reactor will use enriched uranium as a fuel and water as both coolant and moderator.

The other four are to be stepped-up modifications of existing nuclear reactors: BREEDER REACTOR-This will be a larger sized breeder reactor similar to the one now operating at Arco, Idaho. While it will not be designed to produce economical power, the new breeder will be much larger than its Arco prototype. In addition, it will be much closer to a power producing, continuously operating facility. This new reactor will have a heat capacity of 62,500-kilowatts, as compared with the Arco reactor's 1,400-kilowatts. The reactor's power capacity will be approximately 15,000-kilowatts, which is almost 100 times that of the original breeder.
"GEYSER" REACTOR-Another reactor is to be based on the "geyser reactor" experiments which were conducted by Walter F. Zinn, director of Argonne National Laboratory, and his associates. Dr. Zinn's group constructed a small reactor to study the effect of insufficient water supplies and rapid rises in temperature on a water-cooled nuclear reactor. In these tests, the reactor control rods were rapidly ejected from the pile, causing the reaction to jump its power output from a few watts to several thousand in a fraction of a second. This caused the cooling water to boil so violently that it was forced out of the reactor in a small geyser-like stream. However, several tests showed that the boiling also reduced the reactor's power so quickly that no serious damage was done. Now this process is to be studied in the new reactor of this type as a possible method of heat extraction. It also may point the way toward eliminating a step between the cooling material in the reactor and the turbines which run the power generator, since steam generated in the reactor will be fed directly into the turbines. This reactor will be operated at a rated capacity of 5000-kilowatts of electric power.
HOMOGENEOUS REACTOR-This reactor will be a larger version of the Oak Ridge homogeneous reactor, which uses a water solution of uranyl sulfate as both fuel and moderator. It is believed that the new reactor will provide information about corrosion, chemical processing, and operating conditions, as well as power production, which is not possible using the small Oak Ridge installation. In its heat producing capacity, however, the new reactor will be only three times larger than its predecessor. The USAEC does have plans eventually to construct a reactor with 65 times the heat capacity of the 1000-kilowatt Oak Ridge reactor. In this plan, the homogeneous reactor will breed uranium-233 in a "blanket" of thorium surrounding a fissionable core.
GRAPHITE MODERATED--LIQUID METAL COOLED- The last reactor in this program will combine the features of two existing reactors: the breeder reactor and the graphite-moderated Hanford plutonium reactor. The new reactor will use a sodium-potassium alloy as coolant, as does the breeder reactor, and graphite as a moderator. It is believed that this combination will have the advantage of high temperature operation without high pressures being formed by the sodium coolant. Some 20,000-kilowatts of heat will be generated, but no electric generating plant will be operated in connection with it.

The chief question regarding peacetime power which has not been answered--and which may not even be answered by this five-year plan of the USAEC--is that of costs. Pointing up this cost situation is an estimate that the Idaho submarine ractor produces power at 10 times the cost of energy supplied locally by the electric utility there. Neither are the present nuclear reactors operated by the USAEC cheap to build or operate. The submarine thermal reactor, for example, costs up to $2000 a kilowatt to build, compared with about $180 a kilowatt for a modern steam power plant. However, this reactor does prove one thing: It is possible to build a power reactor which will run continuously and efficiently for a relatively long period.

NEW BOOKS & OTHER PUBLICATIONS...in the nuclear field...

Atomic Power Symposium: Fifteen Papers, as Presented. This report is a collection of the papers presented at an atomic power symposium held at Chalk River, Ontario, September, 1953. The papers were written by engineers and scientists of Atomic Energy of Canada, Ltd., and by members of the staff of the Hydro-Electric Power Commission of Ontario, and of the Shawinigan Water and Power Co. 200 pages. --Scientific Documents Office, Atomic Energy of Canada Ltd., Chalk River, Ontario, Canada. ($C2.00)

Study of Electric Power Generation Utilizing Heat Energy from Power Breeder Reactors, by J. D. Selby, M. B. Dagan, R. H. Shannon. Work done at Knolls Atomic Power Laboratory. (Declassified Aug. 27, 1952; published Nov. 19, 1951.)--Office of Technical Services, Washington 25, D. C. (25¢)

Analysis of Uranium-Titanium Alloys, by G.W.C. Milner and P.J. Phennah. Work done at Atomic Energy Research Establishment, Harwell, England. 16-pages.--British Information Services, New York 20, N. Y. (65¢)

Recommendations for the Disposal of Carbon-14 Wastes. Prepared by the National Committee on Radiation Protection, Subcommittee on Waste Disposal and Decontamination. This is National Bureau of Standards Handbook No. 53. (Handbooks 48, 49, 51, 52, and 56, dealing with problems of radioactive contamination, waste disposal, and instrumentations, have already been published. Information on them may be obtained from the NBS). 14-pages.--Superintendent of Documents, Washington 25, D. C. (15¢).

Bibliography of Literature on Nuclear Engineering. Prepared by M.B. Morgan, L. Lyons, and V. Woodman, of Olin Industries, E. Alton, Ill. May be ordered as Document 4202.--Chief, Photoduplication Service, Library of Congress, Wash. 25, D. C. (Microfilm: $1.75, Photostat: $2.50)

Target Areas for Civil Defense Purposes. Official list, as prepared by Office of Civil Defense, of the principal cities in the U. S., with their population, etc., which are considered potential atomic bomb target areas. --Superintendent of Documents, Washington 25, D. C. (15¢)

NEWS OF PRODUCTS & PROCESSES...in the nuclear field...

INSTRUMENTS:-Now in successful operation at the University of California's Radiation Laboratory is the world's most powerful particle accelerator. This Bevatron, which has gone into operation some 6-years after it was designed, has achieved an accelerating energy of 5 billion electron-volts. It was built at a cost of $9 million, with funds supplied by the USAEC. Dr. Ernest O. Lawrence, director of the Radiation Laboratory, said that UCRL physicists are now working to push the machine to its design energy of 6.25 billion electron-volts.

A Van de Graaff accelerator, the first unit to be devoted exclusively to research in radioactive well logging, has now been installed in the Tulsa, Okla., research laboratory of Well Surveys, Inc. This firm, which originated gamma-ray and neutron oil well logging, is the only one engaged solely in research and development in this field. The only other accelerator in the entire oil industry is a similar machine recently installed at the Magnolia Field Research Laboratory, Dallas, Tex. The company points out that more information about the strata surrounding a borehole can be obtained from radioactivity logs when more is known about the effect of neutrons and gamma rays on various types of geological formations.

PRODUCTS:-Three contracts for nuclear equipment totaling some $25,000 have recently been awarded Tracerlab, Inc., Boston nuclear products firm, by Union Carbide & Carbon. The first is an extension by $13,000 to a current $130,000 contract for monitoring equipment now being designed and built for Carbide by Tracerlab for the gaseous diffusion plants operated by Carbide as a prime USAEC contractor. The second contract is for 20 "monitrons", or small area and background monitoring systems, for use at Oak Ridge National Laboratory, also operated by Carbide. Third contract is for the manufacture of 600 units for a special instrument being built by members of the Oak Ridge National Laboratory staff.

NOTES: A one week advanced course in applied instrumentation will be offered by Oak Ridge National Laboratory, Oak Ridge, Tenn., beginning this June 28th. The course will consist of a group of lectures on instrumentation techniques, with demonstrations of modern instruments by technical representatives of the various instrument manufacturers. Fee is $25.00.

RAW MATERIALS...radioactive mineral and ore developments...

UNITED STATES:-Colorado- A uranium-vanadium discovery has reportedly been made about 15 miles southwest of Dove Creek, in country where no uranium has been discovered before; find was made by Slagter Exploration Co. Officials of the firm state that some 5,000 to 6,000 tons of ore have been blocked out with "high ore percentages".....First shipment of uranium and vanadium ore will be made shortly by Golden Cycle Corp., Colorado Springs, M. E. Shoup, president, has stated. He said the ore has assayed 0.3% uranium oxide equivalent, and with the vanadium content assays about $40 a ton. The company holds five claims.

CANADA:- Various details of the uranium business, and its future, were explained at some length at the meeting in Toronto last fortnight of the Prospector's and Developer's Association. Dr. D. A. Keys, vice-president, National Research Council (Canada), said that the demand for uranium is going to increase considerably, due to its necessity to supply power. Dr. T. E. Gillingham, of the USAEC, noted that the U. S. has $4 billion invested in plants "which have an enormous appetite for uranium". He asserted that military demands won't decrease, and now uranium is needed for atomic power. Government guaranteed prices hold until 1962, he explained, and beyond that he could see the outlook very optimistic so far as the uranium market is concerned. Concerning world supplies, he observed that the Belgian Congo (Union Miniere du Haut-Katanga) is still the leader, although no new mines of importance have been opened there. Coming up strongly, however, is South Africa, he said, which is in second place and still gaining. Now, twenty-three gold mines on the Rand are uranium producers, and 14 plants are operating to effect recovery. He said that four mines have already paid dividends from uranium. (Dr. Gillingham was referring to by-product uranium, which is being recovered from the residues or slimes of gold refinining operations.)

Pronto Uranium Mines, Ltd., is now calling for tenders for the sinking of a production shaft on its main Blind River property. Conservative tonnage estimates released by management give an orebody of 1,820,000 tons averaging 0.133% uranium oxide equivalent. Officials feel that they can obtain a price considerably in excess of $7.25; production aims are a minimum initial rate of 1,000-tons daily. (The original uranium ore discovery in the Blind River area was made by Peach Uranium mines. Subsequently, it was renamed Pronto Uranium Mines, Ltd., and recapitalized, with Preston East Dome Mines, Ltd., and Frobisher, Ltd., participating in financing with the Hirshhorn interests.)

ATOMIC PATENT DIGEST...new U. S. grants made...

Ion source. Comprises (in part) an annular ionization chamber with a radially directed magnetic field across this chamber. An electron emitting filament is in the center of this chamber. Means are provided to direct the electrons emitted from the filament radially across the chamber, and thence back to the filament, and means to expel ions from the ionization chamber. U. S. Pat. No. 2,672,560 issued Mar. 16, 1954; assigned to Consolidated Eng. Corp., Pasadena, Calif. (Inventor: C. E. Berry.)

High intensity operation of Geiger tubes. The combination comprising (in part) a Geiger-Muller tube, and means for periodically superimposing a momentary overvoltage pulse on this tube, this overvoltage pulse being equal to substantially 20% or more of the source of voltage. U. S. Pat. No. 2,672,561 issued Mar. 16th, 1954, to Samuel W. Lichtman. (Address of record at date of patent filing: Oxon Hill, Md.)

Thermionically emissive element. Comprises (in part) a thermionically emissive element heated with a radioactive substance. The relation of the two materials is such that radioactive emission from the radioactive material causes a heating and consequent thermionic emission from this thermionically emissive material. U. S. Pat. No. 2,672, 567 issued Mar. 16th, 1954; assigned to The Rand Corp., Santa Monica, Calif. (Inventor: Luis W. Alvarez.)

Sincerely,

The Staff,
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